

the plasma, so that both the ions and electrons are bipolarly diffused toward the wall. At this time, the potential of the plasma takes on its maximum where the plasma density, i.e., the ion density, is the maximum. This potential is termed the plasma potential  $V_p$ , approximately expressed by  $V_p \approx T_e \times \ln(m_i/m_e)$ , where  $T_e$ ,  $m_i$  and  $m_e$  are the electron temperature, the mass of an ion, and the mass of an electron, respectively. In the plasma, the potential distribution is determined by the potential  $V_p$  and the wall potential (ordinarily at 0 V), so that the density distribution is correspondingly determined. Since, in this case, the plasma is confined by the electrostatic field established by itself, the density distribution is determined by the shape of the apparatus, the place where the induced electric field takes on the maximum, and the ratio of the generation rate/the bipolar diffusion flux.

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IN THE CLAIMS:

Please cancel Claims 1 - 11 without prejudice or disclaimer.

Please add new Claims 12 - 18 as follows:

--12. A plasma processing apparatus comprising:

a vacuum chamber enclosing a portion where plasma is generated and

having an flat upper face and an inclined side wall around the portion such that the vacuum chamber has a trapezoidal form in cross-section;

an antenna coil wound around said side wall;

a power source for supplying a predetermined frequency electric power to the antenna coil;

a Faraday shield disposed in a floating position to a ground and provided

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around said side wall enclosing the portion;  
a gas supply unit for supplying gas into said vacuum chamber;  
a sample stage on which a sample to be processed is placed; and  
a discharge unit for discharging the gas below said sample stage out of said  
vacuum chamber.

13. A plasma processing apparatus according to claim 12 further comprising:  
a plate made of a conductor or a semiconductor and placed on an inner side  
of the upper face of the vacuum chamber.

14. A plasma processing apparatus according to Claim 13, further comprising:  
a radio-frequency power source applied to said plate so as to apply radio-  
frequency waves to said plate.

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15. A plasma processing apparatus according to claim 13, further comprising a  
DC voltage source applied to said plate so as to supply DC voltage to said plate.

16. A plasma processing apparatus according to Claim 13, wherein said plate is  
grounded.

17. A plasma processing apparatus according to Claim 12, wherein a radius  $R_d$   
of lower face of said trapezoidal form and a height  $H$  from said sample stage to the  
upper face have a relation such that  $H / R_d \leq 1$ .

18. A plasma processing apparatus according to Claim 12, wherein a radius Ru of the upper face and a radius Rd of the lower face and a height H from said sample stage to the upper face have a relation such that  $\tan^{-1}\{(Rd-Ru)/H\} \geq 5^\circ$ .

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